

# PATENT ABSTRACTS OF JAPAN

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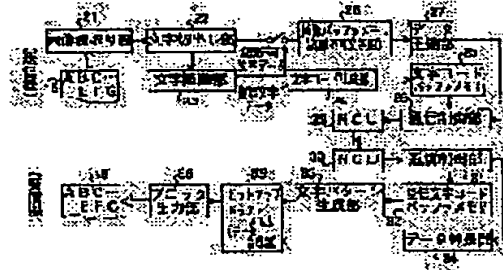
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## (54) FACSIMILE EQUIPMENT

### (57)Abstract:

**PURPOSE:** To relax congestion of transmission traffic and to send a beautiful picture without missing of information of an original picture even when an OCR cannot recognize a character by using the OCR so as to compress transmission data quantity through the character recognition thereby reducing the transmission time with respect to the facsimile equipment.

**CONSTITUTION:** A picture read section 21 reads a transmission original 15 and a character segmentation section 22 segments character, information and a character recognition section 23 recognizes a character. The recognized character is coded by a character code generating section 24 and the result is sent. Character information unable to be recognized is stored in a picture buffer memory 26 as bit map information and compressed in a data compression section 27 and the result is sent together with character code information. The received character code information is given via a reception character code buffer memory 32 in a character pattern generating section 33 and synthesized in a bit map buffer memory 35 together with the bit map information expanded by a data expansion section 34 and outputted from a plotter output section 36.



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[Title of Invention] Facsimile Apparatus

[Claims]

A facsimile apparatus with Optical Character Reader (OCR) comprising image scanner, character detecting portion, and character recognizing portion, wherein the image scanner converts a character on a surface of a draft paper into an image information, and the character area detecting portion defines character area from the image information, and the character recognizing portion identifies the character as codes based on the image information, the facsimile apparatus further comprising:

A transmitter includes means for transmitting the coded image information of the character and means for transmitting a bitmap image information, wherein the codes of the character are generated by character recognizing portion based on the coded image information of the character, and the bitmap image information wherein the image information of the character corresponding to the codes of the character has not been identified by the character recognizing portion; and

A receiver includes means for forming a character pattern converted from the coded pattern information of the character which has been transmitted, and means for data synthesis, wherein received bitmap image information and the pattern information of the character are synthesized.

2. The facsimile apparatus of claim 1 further comprising the means for transmitting an image information restrictive of a character area(s) wherein the character image information have been recognized by the character recognizing portion, as a bitmap image information after replacing the character image information in the area by a blank data.

3. The facsimile apparatus of claim 1 or 2 further comprising means for making a decision, whether only bitmap information should be transmitted, or both a bitmap information and a character code information of characters should be transmitted, based on the rate of recognition of characters expressed by the number of recognized characters recognize by the character recognizing portion to that of the character areas recognized by the character area detecting portion.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a facsimile apparatus, especially to those having a function to read a character on the surface of a draft paper directory utilizing an Optical Character Reader (OCR).

[0002]

[Prior Art]

Recent development in researches related to character

recognition improved the rate of character recognition of Optical Character Reader (OCR) used as a data entry device for computers including personal devices. In the mean time, facsimile apparatus in compliance with G3 standard protocol is capable of performing character communication with certain terminals using Echo Canceller Method (ECM).

[0003]

For example, Fig.7 illustrates the elements of typical OCR entry device in block diagram. The OCR entry device of Fig.7 has an image scanner 1 which reads images on draft papers. Using line image sensor 2, the image scanner 1 converts image on a surface of a draft paper, line by line into electrical signals, then video amplifier 3 amplifies the signals, and the signals are digitized by digitizer 4, then the digital data are stored in line buffer 5.

The information in line buffer memory 5 is processed by a fine image compensator 6 to process a fine portion(s) in the of character, and character area detecting portion 7 picks up the area occupied by every character, judging the line alignment and spaces between characters, then character feature extracting portion 8 normalizes the size of the extracted character pattern, and conduct edge extracting treatment of the character, and character recognizing portion 9 recognizes the character with reference to data in character dictionary 10, then character code generator 11 converts every character into codes, referring

to the contents of character code pattern memory circuit 12 in which the pattern of every character is expressed by character code(s) through pattern matching.

The generated character codes are stored in a buffer memory (not shown), then transmitted through an interface circuit 14. Above described elements are controlled by a microprocessor 13, and the sub-scanning motor 18 is used for moving line image sensor 2 or the draft paper sequentially in order to read the draft line by line.

[0004]

When the character codes for all characters within one page of the draft are generated, the recognized characters by OCR are displayed on a host CRT (not shown). The unrecognized characters can be entered manually by an operator for correction through device such as a keyboard. If above mentioned OCR technology is used in facsimile apparatus, the images can be transmitted with higher quality and reduced amount for data communication. Therefore, facsimile apparatus with OCR function is now under development.

[0005]

For example, the conventional facsimile apparatus of this kind are described in Japanese Patent Publication of Unexamined Application Nos. H1-256861, H1-291572 and H1-305485.

[0006]

[Problems to be Solved by the Present Invention]

However, such conventional facsimile apparatus, as described in Japanese Patent Unexamined Application, Publication No. H1-305485, can prevent errors in recognition of characters raised during the transmission of an image information between the facsimile apparatus equipped with an OCR, but is incapable of correct errors if OCR fails to recognize characters.

[0007]

A facsimile apparatus described in Japanese Patent Unexamined Application, Publication No. H1-256861 process received information in the receiving site after distinguishing whether the information is a bitmap image information or a character code. In the case when a conventional OCR fails to recognize and convert a character into corresponding character code, OCR assign and outputs a character code such as code for '?' so that an operator can correct the draft by key entering the unrecognized character. However, this method of correction can not be used by the receiver of facsimile document, since the unrecognized character can not be re-entered by looking up the original draft. The reliability of facsimile communication declines if a draft with unrecognized character is sent since the missing information can never be recovered.

[0008]

A facsimile apparatus seen in Japanese Patent Unexamined Application, No. H1-291572 can distinguish the capability of

receiving site to process character code, and decide whether draft is sent in a bitmap image information or character code. However, even if the receiving site can process character code, an unrecognized character can never be converted into a character code if a draft with an unrecognized character code is sent from the sending site.

[0009]

An object of the present invention is to shorten the time of document transmission and to reduce data traffic by compressing the amount of data to be sent using character recognition of OCR. Another object of the present invention is to provide a facsimile apparatus capable of sending clear image without missing original information even if OCR fails to recognize a character.

[0010]

The facsimile apparatus of claim 1 of the present invention having an image scanner which converts an image on the surface of a draft paper into corresponding digital image information, and a character area detecting portion which extracts a character information from the digital image information, and a character recognition portion which recognize a character information so as to assign a code for the character information characterized in that:

A transmitter includes means for sending a character, which has been recognized as a character, as corresponding

character code, and means for sending a character information which has not been recognized as a character by the character recognition portion, as a bitmap information.

A receiver includes means for generating a character code pattern which converts received character code information into a character pattern information and a data synthesis portion which synthesizes the bitmap information and the character information.

The invention of claim 2 is characterized in that the means for sending a bitmap information is capable of sending an image information as a bitmap information wherein the character areas corresponding to the characters recognized by the character recognition portion are replaced with a "white" data.

The invention of claim 3 is characterized in means for automatically making a decision about whether only bitmap information should be sent or both bitmap information and character information should be sent to the receiving site according to the character recognition rate which is defined as a ratio of numbers of recognized characters in the character recognition portion to the number of character areas detected by the character area detecting portion.

[0011]

#### [OPERATION OF THE INVENTION]

In the claim 1 of the invention the character information



recognized as a character information by the character recognition portion is assigned corresponding character code and other remaining character information which is not recognized as a character information is designated as a bitmap information. They are both sent to receiving cite and there the character code information is converted into a character pattern and then a synthesized information product of both information is output. Consequently, the character information which is recognized and converted into a character code by the OCR is compressed, so that transmission of the character information can be achieved within a short period of time so that load to a crowded data transmission lines be relieved and a clearer image of character than that of the original draft will be sent. Those characters not recognized by OCR are sent as standard bitmap information, so as to improve the reliability of communication wherein missing of information is prevented.

[0012]

Claim 2 of the present invention, especially when the draft is composed of both drawing(s) and characters, the character information recognized by the character recognition portion is converted into character codes and other information, i.e. the image information derived from areas excluding those of recognized characters is sent as a bitmap information. Consequently, the draft containing both drawing(s) and characters is able to be sent without missing any image

information on the draft and thus achieving high degree of transmission reliability of information and drawing(s) and clear characters can be sent within a reduced transmission period since the amount of data to be sent will be reduced as a whole due to data compression of character information.

[0013]

In the invention of claim 3, the method of sending information is selected according to the rate of character recognition defined as the number of recognized characters vs the numbers of corresponding character areas or blocks in the draft. If a draft, for instance, is mainly occupied by drawing(s) with relatively small number of character areas or when number of character areas or blocks is large with low character recognition rate, then the draft should be sent as a bitmap information alone since not so much improvement in image quality of the draft is expected. In case other than above, the information with both bitmap and character codes should be sent so that the whole amount of the data for transmission is reduced achieving improvement of image quality. As described above the selection of the method of sending the image information can be automated by adjusting number of character blocks or character recognition rate through evaluation of each draft with respect to the above predetermined criterion.

[0014]

[DESCRIPTION OF THE PREFERRED EMBODIMENTS]

A mode for carrying out the present invention is described with reference to the figures. Fig.1 and Fig.2 show a construction of the facsimile apparatus according to the embodiment of claim 1 of the present invention.

[0015]

As shown in Fig.1, the OCR of the facsimile apparatus of this embodiment is composed of an image scanner 21, a character area detecting 22 and a character recognition portion 23. In a sending site of the facsimile apparatus, a means for sending character code operates as follows: a draft paper 15 is scanned and character areas are detected by the character detecting portion 22 followed by recognizing characters in the character recognition portion 23. The recognized character data is converted into corresponding character codes by a character code generator 24 and these character codes are stacked in a character code buffer memory 25. The character codes are then sent to a modem in a communication controller 28 where modulated signals are sent out to a public telephone communication line through a NCU 29 (communication network control unit).

[0016]

As a means for sending a bitmap information, the unrecognized characters in the character recognition portion 23 are stacked in an image buffer 26, and then the image data is compressed by a data compressor 27 and are modulated in a communication controller 28 where the modulated signals are sent out to a public

telephone communication line through the NCU 29.

As a means for generating character pattern at a receiving site, the signals received by a NCU 30 is demodulated in a modem in a communication controller 31, and then stacked in a received code buffer memory 32 followed by being converted into corresponding character patterns by character pattern generator 33.

[0017]

A means for data synthesis is composed of a bitmap buffer memory 35, where the compressed bitmap information at sending site is decompressed by a data magnifier 34, and the image is reconstructed by synthesizing the bitmap information with the character patterns. The synthesized image is printed out by means of a plotter 36 resulting a draft 16 received.

[0018]

Now the working effects of the present invention will be explained. Fig.2 illustrates a flow stream of the draft in both sites of sending and receiving and under transmission by the facsimile apparatus of Fig.1. The surface of the draft paper 15 containing original inmate is scanned by the image scanner 21, and the character areas are detected by the character area detector 22. Here, as shown in Fig.2, in the case when three letters of "D", "G" and "L" are not recognized, the rest of the characters are converted into character codes individually by the character code generator 24 and are stacked in the character

code buffer memory 25, while unrecognized three characters of "D", "G" and "L" are stacked in the image buffer memory 26 as a bitmap information. After the completion of the above procedures for one page of the draft paper, then such items as strings of character codes and blocks or areas of unrecognized characters, address information of characters indicating locations of each characters in the processed draft and information about font and size of each character are sent to the communication controller 28 as attributive information for a unit of line or column of characters in the draft where character codes and unrecognized character blocks are sent separately through the communication network control unit (NCU) 29.

[0019]

On the receiving site, when at least one line of character information has been sorted and synthesized from separately transmitted character information by the character synthesis portion, i.e. the bitmap buffer 35, the received character information is printed out by means of the plotter 36. As illustrated in the received image in Fig.2, those characters other than "D", "G" and "L" are printed in a better quality than original by using the character code generator 24 on the sending site, since the character patterns are generated based on the corresponding character codes by the character pattern generator 33 on the receiving site.

Furthermore, the unrecognized characters "D", "G" and

"L" are output as bitmap information level without omission eliminating an opportunity of missing an important information and this will render and maintain reliability to the facsimile data transmutation.

It is also possible to have an operator input correct data by a keyboard after confirmation of the unrecognized character(s) visually achieving uniformity of characters throughout the information and these operation will enables a receiving party to record and manage the draft from the sending site in a suitable recording medium such as a floppy disk of a word processor.

[0020]

The OCR process of the present invention should not be limited to the method of pattern matching described in the description of the prior art of the present invention. The object of recognition should not be confined to alphanumeric character but may include "kana" and "kanji". Further, the OCR process may be applied to other types of character than printed format such as those hand-written. Fig.3 and Fig.4 illustrate another embodiment in claim 2 of the present invention.

[0021]

Since basic construction according to this embodiment is almost same as schematically shown in Fig.1, description is confined to the characteristic features avoiding duplicated description. As shown in Fig.3, the means for sending bitmap

information of claim 2 is characterized in a white (empty) data replacement portion where the character areas having characters recognized by the character recognition portion 23 are replaced by empty data.

[0022]

According to this specific feature, the draft 15 consisting of a drawing and characters as shown in Fig.4, can be subjected to character area detection and the areas where characters are recognized are replaced as a whole by a white region the white data replacement portion 37. As shown in the OCR processed draft 15a, the areas excluding those for "shi" and "za", both of which are not recognized as characters, are replaced by white data and resulting OCR processed draft 15a, an image information, is stacked in the image buffer memory 26 as a bitmap information and sent to the receiving site after data compression in the data compressor 27 in a usual manner for data compression. Therefore, the more the number of areas or blocks for recognized character, the more white or empty areas in the OCR processed draft 15a which may approaches to the image of all-white with high rate of compression. Since recognized characters are sent as character codes, the total amount of information is significantly reduced, thus sorting the time of transmission avoiding data traffic confusion.

[0023]

As shown in the received draft 16 in Fig.4, non-character

information such as drawing(s) or text boxes is sent as a conventional bitmap information so as to prevent missing of information, and to maintain original image quality. In addition, recognized characters are output at receiving site with higher image quality than the original draft.

[0024]

Fig.5 and Fig.6 illustrate an embodiment of claim 3 of the facsimile apparatus of the present invention. Fig.5 illustrates the construction of sending site of facsimile apparatus of claim 3 in a block diagram. The characteristic feature of the construction of claim 3 is that the rate of character recognition is calculated by the number of character areas or blocks detected by the character area detector 22 and the number of recognized characters recognized by the character recognition portion 23. According to the rate of character recognition it is selected and judged whether the draft image should be sent only by bitmap information or in a format wherein character codes and bitmap information are mixed.

[0025]

More specifically, the data of one draft page scanned by the image scanner 21 is stacked in the page memory 38 in Fig.5 and the number of recognized characters are counted by a recognized character counter 39, then the counted number is input to a OCR data judgment port 40. Also the number of characters unrecognized by the character recognition portion 23 is counted



by a unrecognized character counter 41, then the counted number is input to the OCR data judgment port 40.

[0026]

The number counted in the recognized character counter 39 and the number counted in the unrecognized character counter 41 are added at the OCR data judgment port 40 providing number of detected character areas or blocks by the character area detector 22. The rate of recognition is calculated by dividing the number of recognized characters counted by the recognized character counter 39 by the number of character areas or blocks. The rate is compared with a previously adjusted value, and a switch 42 is controlled base on the comparison.

[0027]

The operation is described as below. As shown in the flowchart of Fig.6, the image scanned by the image scanner 21 is stacked in the page memory 38 at step S100. Characters areas detected by the character area detector 22, and converted into a character code by the character recognition portion 23 at step S101, then the number of recognized characters is counted by the recognized character counter 39 and the resulted number is compared with a previously adjusted value A of the OCR data judgment port 40 at step S102.

[0028]

If the number of recognized characters is larger than A, it is proceeded to step S103. Then, if the rate of recognition

is larger than B, is proceeded to step S104, and a call if made, and the switch 42 is controlled based on a protocol at step S105. At step S106, if the receiving site is found to be capable of receiving OCR draft at step S106, a draft is sent in a mode in which both character code(s) and bitmap information are mixed.

[0029]

If the number of recognized characters is less than A, or if the rate of character recognition is less than B, call is made at step S108, then the switch 42 is controlled based on a protocol at step S109, and the draft is sent only with bitmap information at step S110. As described above, a draft is sent according to an automatic selection of either character code/bitmap mixed or bitmap alone so that best image can be sent without having an operator to consider the contents of the draft.

[0030]

The embodiment of the present invention should not be limited to application to facsimile apparatus, but is applicable to OCR itself and recognition of hand-written character.

[0031]

#### [ADVANTAGES OF THE PRESENT INVENTION]

According to the invention of claim 1, OCR communication mode allows sending and receiving images of a character in higher image quality than that in original draft, while preventing missing of information by sending in a conventional bitmap information in case of failure of recognizing the character and

this will reduce total amount of data to be transmitted and leads to an decrease in transmission period.

[0032]

According to the invention of claim 2, an equivalent advantage of claim 1 of the present invention is achieved for a draft including both caricatures and drawing(s), since recognized characters are converted into character codes and a bitmap information excluding recognized characters is sent together with the character codes.

According to the invention of claim 3, a draft is sent with automatic selection of either bitmap information alone or character code/bitmap mixed information depending on the condition of the draft so that best facsimile image can be sent by the most adequate mode keeping consideration about conditions of a draft and a receiving site.

#### [BRIEF DESCRIPTION OF THE DRAWING]

Fig.1 is a block diagram showing the construction of a facsimile apparatus according to an embodiment of claim 1 of the present invention.

Fig.2 shows sending/receiving image and data under transmission.

Fig.3 is a block diagram showing the construction of a facsimile apparatus according to an embodiment of claim 2 of the present invention.

Fig.4 shows sending/receiving image and data under transmission.

Fig.5 is a block diagram showing the construction of a facsimile apparatus according to an embodiment of claim 3 of the present invention.

Fig.6 shows a flow chart explaining the operation of a facsimile apparatus of claim 5.

Fig.7 is a block diagram showing the construction of a conventional OCR device.

[DESCRIPTION OF REFERENCE NUMERALS]

- 15 draft paper
- 15a OCR processed draft
- 16 received draft
- 21 image scanner
- 22 character area detector
- 23 character recognition portion
- 24 character code generator
- 25 character code buffer memory
- 26 image buffer memory
- 27 data compressor
- 28 communication controller
- 29 NCU(communication network control unit)
- 30 NCU(communication network control unit)
- 31 communication controller
- 32 received character code memory

- 33 character pattern generator
- 34 data magnifier
- 35 bitmap buffer memory
- 36 plotter
- 37 empty data locator
- 38 page memory
- 39 recognized character counter
- 40 OCR data judgment port
- 41 unrecognized character counter
- 42 switch



載のもの、送信側のファクシミリ装置において、送信情報の形式を受信側の受信の可否に応じて文字コード情報又はビットマップ情報を選択して送信情報量を削減するものである。しかし、たとえ受信側で文字コード情報の通信が可能であっても、送信側のOCRで文字認識できない場合は、文字コード化できず、情報の欠落が生じてしまうという問題がある。

【0009】そこで、本発明は、OCRの文字認識により送信情報量を圧縮して伝送時間を短くし、伝送トラヒックの混雑を緩和すると共に、たとえOCRで文字が認識できない場合でも、原画の情報を欠落させることなく、美しい画像を伝送することが可能なファクシミリ装置を提供することを目的とする。

【0010】

【発明を解決するための手段】請求項1記載の発明は、送信原画を画像情報に変換して読み取る画像読取り部と、画像情報から文字情報を取り出す文字抽出部と、文字情報に基づいて文字コード化するための文字認識を行なう文字認識部と、読み取ったOCR情報を有するファクシミリ装置であって、送信機側には、前記文字認識部で認識された文字を文字コード化して送信処理する文字コード送信処理手段と、前記文字認識部で認識できなかった文字情報をビットマップ情報として送信処理するビットマップ情報送信処理手段と、が設けられ、受信機側には、送られて来た文字コード情報を文字パターン情報に変換する文字パターン生成手段と、送られて来たビットマップ情報と文字パターン情報とを合成するデータ合成手段と、が設けられたことを特徴とし、請求項2記載の発明は、前記文字認識部が送信処理手段が、文字認識部で認識できた文字領域のみを白データに置き換えた画像情報をビットマップ情報として送信処理することとを特徴とし、請求項3記載の発明は、前記文字認識部で認識された認識文字数及び/又は前記文字抽出部で文字情報として切り出された文字ブロック数と認識文字数とで表される文字認識率に基づいて、送信する情報と文字コード情報を混在させたビットマップ/文字コード混在情報とするかを自動的に選択するようにしたことを特徴とするものである。

【0011】

【作用】従って、請求項1記載の発明では、文字認識部(OCR)で認識された文字情報は文字コード化し、認識できなかった文字情報はビットマップ情報として共に相手方に送信し、受信側では文字コード情報を文字パターン化し、ビットマップ情報と合成して出力する。このため、OCRで認識されてコード化された文字情報は、データ圧縮されることにより、伝送時間が短く済み、伝送トラヒックの混雑が緩和されると共に、画面上の美しい文字を伝送することができる。また、OCRで認識できない文字情報については、通常のビットマップ情報

として送られるので、情報の欠落がなく高い信頼性が得られる。

【0012】請求項2記載の発明では、特に原画が絵と文字とで構成されているような場合に、文字認識部で認識できた文字情報は文字コード化され、それ以外の情報の送信は、画像情報から認識できた文字領域を除いた残りの情報をビットマップ情報として送信することため、絵/文字混在原画でも原画の情報が欠落することなく、絵/文字の信頼性が得られると共に、データ圧縮されて送データ量が減少するので、短い伝送時間で絵と美しい文字とが伝送できる。

【0013】請求項3記載の発明では、原画中の文字ブロック数とその中から認識できる認識文字数との比で表される文字認識率とに基づいて、送信情報の種類を選択する。このため、例えば、文字ブロック数自体が少なくても絵などの情報が大部分を占める原画の場合、あるいは文字ブロック数は多いが文字認識率が低い原画の場合は、ビットマップ情報のみで送った方が効率が良く、画像品質の向上にもあまり期待できない。また、上記と逆の場合は、ビットマップ/文字コード混在情報で送った方が送信情報量が少なくなり、画像品質が向上するという効果がある。このように、文字ブロック数と文字認識率に所定の基準値を設定して、原画の内容に応じた適切な送信情報を自動的に選択できるようにする。

【0014】

【実施例】以下、本発明を図面に基づいて説明する。図1～図2は請求項1記載の発明に係るファクシミリ装置の一実施例を示す図である。まず、構成を説明する。

【0015】図1に示されるように、本実施例のファクシミリ装置は、画像読取り部21、文字抽出部22及び文字認識部23で構成されている。一方、送信機側24及び文字認識部25で構成されている。文字コード送信処理手段は、送信原画15を認識して切り出され、文字認識部23で認識された認識文字データを文

字コード生成部24で文字コード化して、一旦文字コードバッファメモリ28に格納する。そして、通信制御部29内のモデム29aを通じて、変調された信号がNCU(制御部)29bに送出されて、変調された信号がNCU(制御部)29bに送出されて公衆回線へ送り出される。

【0016】ビットマップ情報送信処理手段は、文字認識部23で認識できなかった認識不可文字データを画像バッファメモリ28に格納して、データ圧縮部27でデータ圧縮した後、上記文字コード情報と同様に通信制御部28で伝送されNCU29aを通じて公衆回線へ送り出される。他方、受信機側の文字パターン生成手段31のモデム29aで受信された文字コード情報を通信制御部31のモデム29aで復調し、受信文字コードバッファメモリ32に蓄え、文字パターン生成部33で文字パターン情報に変換するものである。

【0017】データ合成手段は、ビットマップバッファメモリ35から成り、送信機側でデータ圧縮されたビットマップ情報をデータ伸長部34で伸長して元に戻し、前記

文字パターン情報と共にデータ合成を行なって、画像情報を復元する。プロセッサ出力部36は、合成された画像情報を記録紙に印字して、受信原画16を出力する。

【0018】次に、作用について説明する。図2は図1のファクシミリ装置で受信される原画と送信データを説明する図である。原画である送信原画15は、図1の画像読取り部21で読み取られ、文字抽出部22で文字部が切り出され、文字認識部23で文字認識が行なわれる。ここで、図2に示すように、「D」と「G」と「L」が認識できなかった場合、それ以外の文字は文字コード生成部24で文字コード化されて文字コードバッファメモリ25に格納され、「D」「G」「L」の認識不可文字データは、ビットマップ情報として画像バッファメモリ26に格納される。そして、原画の1頁分の認識処理が終了した後は、認識した文字コード列と、認識できなかった文字ブロック列と、それぞれの原画中の該当文字位置を表わすアドレス情報や文字フォントサイズ情報が文字単位、行単位又はブロック単位で付属して、通信制御部28及びNCU29aを通じて別送される。

【0019】受信側では、この別々の情報をデータ合成部20である最低1行分のビットマップバッファメモリ35に合成展開し、これをプロセッサ出力部36によりプリンタ出力することにより、文字コードから文字パターンを生成するため、図2の受信画像に見られるように、「D」「G」「L」を除く他の文字はコードジェネレータによって原画よりも良好な文字画像が得ることができる。そして、さらに「D」「G」「L」のように、不認識文字であっても通常のビットマップレベルで出力されるので、重要な情報が欠落することがなく、ファクシミリ装置としての情報の信頼性を保持することができる。もちろん、受信機側に力用のキーボードを設けて不認識文字を目視して確認することにより、データを修正して文字パターンを統一することも可能である。こうすることによって、送信機側の原画データを、受信機側でワープロファイルとしてフロッピーディスク等にて管理保存を行なうことが可能となる。

【0020】なお、本実施例でOCR処理する場合は、従来例で述べたパターンマッチング法に限定されない。また、認識する文字もアルファベット以外に、カナ文字や漢字であってもよく、括弧認識の他に手書き認識として応用することもできる。図3～図4は請求項2記載の発明に係るファクシミリ装置の一実施例を示す図である。

【0021】基本的な構成については、前記図1と略同であるため、重複説明を略し、特徴的な部分についてのみ説明する。図3に示されるように、請求項2記載のビットマップ情報送信処理手段には、画像読取り部21で読み取った画像情報の中から文字認識部23で認識できた文字領域部分を白データに置き換えた白データ認識部37を備えている点に特徴がある。

【0022】上記のように構成したため、図4に示すように、送信原画15が絵と文字から成っている場合でも、図3の文字抽出部22で文字ブロックとして切り出せて、かつ文字認識部23で認識できた領域を白データ認識部37で白データに置換する。すなわち、これを図4で見ると、認識処理済送信原画16aに示すように、認識できなかった「し」と「ぞ」を除く部分が白データに置き換わった。このように、認識処理後の画像情報(16a)を、ビットマップ情報として画像バッファメモリ26に格納し、データ圧縮部27による通常の圧縮方法で圧縮して送信処理する。このため、文字ブロック数が多く、かつ認識文字数が多くない場合には、認識処理後の画像は全白に近い画像となり、データの圧縮率が高まる上、認識文字も文字コード情報化されるので、送信する総情報量が著しく減少する。従って、ファクシミリの伝送時間を短くすることが可能となり、伝送トラヒックの混雑を緩和することができる。

【0023】また、図4の受信原画18に示すように、絵やイラスト等の非文字部分あるいは認識できなかった文字「し」及び「ぞ」は、従来と同じビットマップ情報で送信するため、情報の欠落がなく、同等の画像品質が得られる上、認識された文字は図3の文字パターン生成部33で合成されて出力されるので、原画の画像品質以上に美しい文字を受信機側に届けられることができる。

【0024】図5～図8は請求項3記載の発明に係るファクシミリ装置の一実施例を示す図である。図5は請求項3記載の発明に係るファクシミリ装置の送信機側の構成ブロック図である。請求項3における特徴的な構成は、文字抽出部22で切り出された文字ブロック数及び文字認識部23で認識された文字数とで算出される文字認識率に基づいて、送信画像をビットマップ情報のみで送信する場合と、文字コード情報とビットマップ情報とを混在させて送信する場合とを選択するようにしたものである。

【0025】具体的には、図5に示されるように、画像読取り部21で読み取られた1頁分の画像情報を記憶するページメモリ38を有している。そして、認識文字カウンタ39は文字認識部23で認識された文字数をカウントし、その認識文字数は、OCR通信係数判定部40に入力される。また、認識不可文字カウンタ41は、文字認識部23で認識できなかった文字数をカウントするもので、OCR通信係数判定部40に入力される。

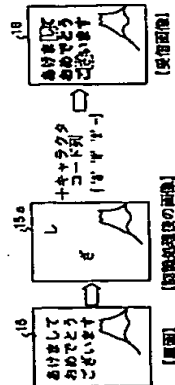
【0026】OCR通信係数判定部40では、認識文字カウンタ39と認識不可文字カウンタ41のカウント値の和が文字抽出部22で切り出された文字ブロック数となり、認識文字カウンタ39の認識文字数を文字ブロック数で割った値が文字認識率となる。そして、これらの結果をOCR通信係数判定部40内で予め設定しておいた値と比較して切換スイッチ42の切換えを制御する。

【0027】次に、作用について説明する。図6のフロ

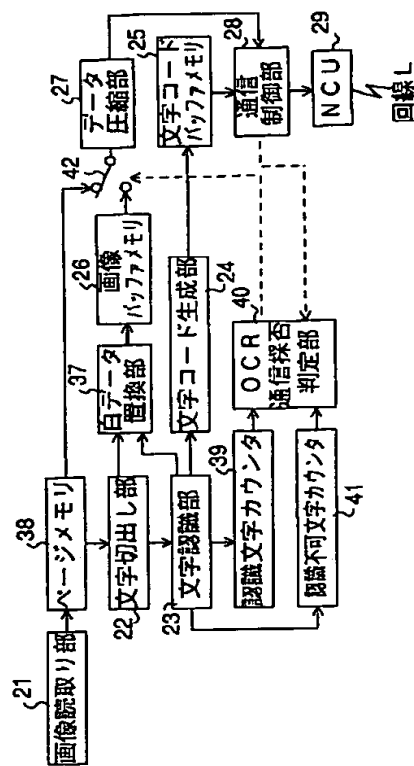




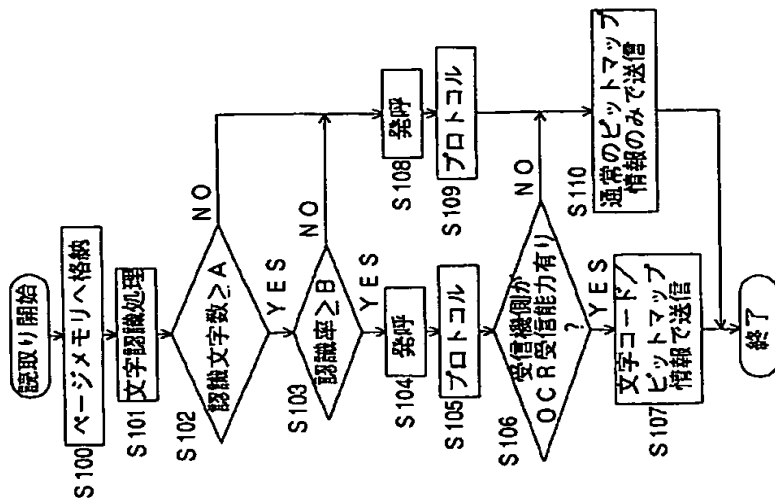
**[圖4]**



**[ 5 ]**



**【図6】**



【図7】

